



Evaluation and management of voiding dysfunction after midurethral sling procedures

Midüretal sling işleminin sonrası işeme disfonksiyonunun değerlendirilmesi ve yönetimi

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Abstract

Midurethral slings have become the most popular surgical procedure for the correction of stress urinary incontinence in women. Urinary retention or obstructive voiding symptoms may arise from partial urethral obstruction as a result of oversuspension of the urethra or exaggerated tension. Fortunately, most cases of voiding dysfunction are transient and resolve spontaneously within days. Clean intermittent self-catheterization is the mainstay of conservative treatment. If symptoms persist, tape mobilization, incision or urethrolysis may be performed. Recurrent stress urinary incontinence may occur in a small group of patients, who may benefit from another incontinence treatment. (J Turkish-German Gynecol Assoc 2012; 13: 123-7)

Key words: Incontinence, midurethral sling, voiding dysfunction, urinary retention, urethrolysis

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Özet

Midüretal slingler, kadınlarda stress idrar inkontinansının cerrahi tedavisinde en çok tercih edilen işlem haline gelmiştir. Üretranın fazla asılması ya da meşin daha sıkı yerleştirilmesi tam idrar retansiyonuna veya obstrüktif işeme semptomlarına neden olabilir. Akut idrar retansiyonu hemen müdahale gerektirir. Neyse ki, çoğu işeme disfonksiyonu geçicidir ve bir kaç gün ile hafta içinde kendiliğinden çözülür. Temiz, aralıklı self kateterizasyon, konservatif tedavinin temelini oluşturur. Konservatif tedaviye rağmen işeme disfonksiyonu devam ederse meş gevşetilebilir, kesilebilir ya da üretrolizis uygulanabilir. Bu da hastalann küçük bir kısmında tekrar tedaviyi gerektirebilecek düzeyde stress idrar inkontinansına yol açabilir.

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Anahtar kelimeler: İnkontinans, midüretal sling, işeme disfonksiyonu, idrar retansiyonu, üretrolizis

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Introduction

Midurethral slings have revolutionized the surgical management of stress urinary incontinence (SUI). Tension-free vaginal tape (TVT), introduced in 1996 by the Ulmsten and Petros, was the first widely available midurethral sling. Since its introduction over 10 years ago, it is estimated that approximately 1 million procedures have been performed worldwide (1). In addition, other techniques such as the suprapubic-arc sling (SPARC), which differs from TVT with respect to the direction of trocar passage, have also gained popularity. In 2001, Delorme described the transobturator tape (TOT) midurethral sling (2). Unlike TVT, it is placed using a transobturator approach rather than a retropubic one. This approach is generally considered to have the advantages of low morbidity, reduced costs and shorter hospital stay (3, 4).

Regardless of the technique, anti-incontinence surgery may change bladder outlet resistance. Voiding dysfunction (VD) is a well-recognized complication of midurethral sling procedures. However, the definition of VD is not consistent in the literature. The vague definition of "impaired bladder emptying immediately following surgery" is often used. Some researchers have studied failed voiding after outpatient midurethral sling as the

outcome measure for postoperative voiding function. Most cases of mild postoperative voiding dysfunction appear to resolve with expectant or conservative management. Transient urinary retention after TVT has been reported in up to 17% of patients, but it is important to distinguish this from voiding dysfunction, which is commonly more clinically significant (5). For example, in the Stress Incontinence Surgical Treatment Efficacy Trial (SISTER), voiding dysfunction was defined as any need for bladder catheterization after 6 weeks, or reoperation for sling takedown (6). The incidence of postoperative retention lasting longer than 4 weeks or requiring intervention following midurethral slings is reported as 2-4% (7). A recent systematic review and meta-analysis of 33 randomized controlled trials found lower rates of voiding difficulties after transobturator sling when compared to retropubic sling procedures. With regards to comparisons with retropubic tape, TVT and intravaginal slingplasty had similar complication rates, whereas SPARC was complicated by higher rates of voiding lower urinary tract symptoms and reoperations (8). However, the most recent Cochrane review and meta-analysis, which compared the incidence of postoperative VD by the midurethral sling approach, specifically between the transobturator and retropubic approaches, found no difference across 24 trials (9).

Risk factors

The debate on the risk factors for VD following midurethral slings continues despite several studies which have focused on this topic.

Demographics and other associated factors

Due to variable results from different studies, it is difficult to make a decisive conclusion about the demographic predictors of VD after midurethral sling. Sokol et al. (10) found that older age, low body mass index (BMI) and postoperative urinary tract infections (UTI) were independently associated with prolonged time to adequate voiding; however, in this study, a previous history of incontinence surgery was the only independent variable predictive of urinary retention. Barron et al. (11) showed that parity over two and preoperative anxiety were independently associated with successful immediate voiding trial after a TVT procedure in their retrospective review of 126 patients. Barber et al. (12) have found that poor preoperative detrusor function may have a role as well. Women frequently have concurrent abdominal or pelvic surgery at the time of midurethral sling placement. Shukla et al. (13) described a trend toward long-term voiding difficulty when women with low preoperative flow rates underwent concurrent posterior vaginal repairs. Most recently, a multicenter case-control study by Molden et al. (14) reported that preexisting obstructive voiding symptoms, the retropubic approach and concurrent surgery at the time of sling placement were independent risk factors for sling revision.

Urodynamic parameters

According to several studies, low preoperative peak flow rates or abnormal uroflow can be predictive of postoperative VD after midurethral sling procedures. In a retrospective review of 59 women who underwent TVT, Wang et al. (15) described VD as the following: postvoid residual volume (PVR) of more than 100 ml, urinary frequency greater than six times per day or two times per night and urinary stream perceived as abnormal by the patient. In this study, abnormal uroflowmetry, which was defined as flow that did not have a normal configuration or pattern, was found to be an associated factor. A prospective trial of 89 women who underwent the midurethral sling procedure showed low peak flow rate to be the only independent variable for a successful initial voiding trial (16). This is consistent with another retrospective study of 375 patients by Hong et al. (17), which also found lower preoperative peak flow rates as a risk factor. In this study, the parameter for VD was defined as the need to catheterize for 72 hours or longer after surgery. The mean preoperative peak flow rates in the group with and without urinary retention were 22.3 and 29.7 ml/s, respectively. Sung-Tae et al. (18) suggested that a peak flow rate lower than 15 ml/s was the most predictive variable for postoperative VD.

Some studies investigated the effect of preoperative residual on postoperative VD. In a report of 205 TOT and 213 TVT, Barber et al. (12) found high preoperative PVR to be a consistent risk factor for prolonged postoperative catheterization and slow resumption to normal voiding. In contrast, Minassian et al. (19) retrospectively analyzed 138 patients who underwent anti-incontinence surgery, including TVT, Burch or pubovaginal slings

and found that patients with early postoperative VD (defined as a residual of >200 ml at discharge) had lower preoperative PVRs than those who did not (50 vs. 75 ml).

Barron et al. (20) reported that a Valsalva leak point pressure of more than 60 cm H₂O and a maximum urethral closure pressure of more than 20 cm H₂O were associated with a successful immediate voiding trial.

Despite the aforementioned studies, numerous other studies have shown no association between postoperative VD and the parameters such as preoperative peak flow rate, preoperative PVR, Valsalva leak point pressure or severe intrinsic sphincter deficiency (15, 18, 20-24). We were not able to find any report which studied the type of voiding mechanism and detrusor pressures with respect to VD after midurethral slings (25).

Evaluation and diagnosis

Urethral obstruction after midurethral sling procedure surgery can manifest itself in a variety of ways. Patients may complain of slow urinary stream, splitting or spraying, hesitancy or intermittency with the urine flow, feelings of incomplete emptying, prolonged voiding, straining to void and elevated PVR. Urinary retention may also lead to overflow incontinence, recurrent UTI and painful urination. They may also develop de novo or worsening detrusor overactivity.

The optimal evaluation for patients with postoperative VD is poorly defined in the literature. One should start with a careful pelvic and rectal examination which may identify underlying findings such as abnormal urethral angulation, a foreshortened, non-pliable vagina, non-mobile urethra, pelvic hematoma or fecal impaction. During evaluation, UTI should be ruled out with urinalysis and culture as this can manifest itself with a variety of symptoms. There is a no general consensus on the appropriate PVR volume to diagnose urinary retention. In some studies, PVR cutoff for urinary retention has varied from 100 to 200 ml (23, 26). Some authors choose to use a percentage of total volume as an indicator. Techniques to evaluate the adequacy of postoperative bladder emptying also vary tremendously. In a prospective study, Kleeman et al. (27) found that the back fill technique after vaginal prolapse or continence surgery predicted adequate bladder emptying in 91% of women who voided 50% or greater of the amount instilled and in 100% who voided 68% or greater of the total volume.

The best location for cystourethroscopy and urodynamic studies is controversial. Some authorities advocate videourodynamic studies to diagnose obstruction prior to the reversal of anti-incontinence surgery. Under the ideal circumstances, urodynamic evaluation would differentiate patients with high-pressure, low-flow voiding consistent with obstruction and patients with detrusor hypocontractility. In a study by Carr and Webster, urodynamic parameters, previous surgery, time from suspension to urethrolysis and the surgical approach were not good predictors for urethrolysis (28). Cystourethroscopy may be useful to rule out bladder pathology, a hypersuspended bladder neck and foreign bodies such as retained sutures, mesh or stones. In another study by Petrou et al. (29), urethrolysis outcomes were not significantly different when urodynamic parameters were used instead of clinical criteria. At the present

time, there does not appear to be conclusive evidence to support routine implementation of these tests before any surgical corrective procedure.

Treatment

Conservative treatment

Transient postoperative urinary retention has been reported to be within the range of 2.5 to 36% after surgery for SUI and pelvic organ prolapse (POP) (30, 31). Suprapubic catheter placement, which was common before midurethral sling procedure was introduced, has been widely abandoned as prolonged postoperative VD is uncommon after this minimally invasive approach. Temporary Foley catheter drainage, timed voiding, biofeedback, pelvic floor muscle training, clean intermittent self-catheterization, selective medical treatment and urethral dilatation have been successful to some degree in managing postoperative VD. Expectant management is initially appropriate as early retention may be due to postoperative pain, edema and inflammation. Indeed, most patients with transient postoperative urinary retention resume normal voiding following midurethral sling within 1-2 days of the procedure. Return to normal voiding may be delayed for 1-2 weeks in women with a history of prior or concomitant surgery for SUI or POP (32, 33). Behavioral treatment begins by encouraging the patient to create a relaxing environment and taking adequate time for voiding. They are instructed to slow down, take a deep breath, relax the body, relax the pelvic floor muscles and wait for the urine to flow. Rushing can inhibit pelvic floor relaxation. Valsalva voiding can increase pelvic floor tension, resulting in incomplete emptying. Anecdotally, some women have benefited from double voiding, or lingering until another detrusor contraction brings about more complete emptying. Perineal or vaginal biofeedback, which can be useful for restoring muscle tension, is a particularly important practice for patients with VD. To facilitate relaxation, these patients can focus more on the relaxation phase, which can be extended with a 1:2 ratio or longer as appropriate (34).

Medications play a small role in the treatment of postoperative VD. Diazepam 2-10 mg 1-3 times daily and baclofen 5-10 mg twice daily may also be used in an effort to reduce urethral sphincter and pelvic floor spasm from pain (35). Some may use an α -adrenergic antagonist such as terazocin or doxazocin, but there are limited scientific data. These antagonists, which can cause postural hypotension as a significant side effect, are also effective for functional rather than anatomic bladder outlet obstruction. Antimuscarinic medications may be helpful when there are predominantly irritative symptoms and a normal PVR. Specifically, oxybutynin has a combination of antimuscarinic, antispasmodic and local anesthetic properties. However, these medications are contraindicated in women with urinary retention. Vaginal estrogen may be useful for reducing irritative voiding symptoms and recurrent infections (36).

When a patient cannot empty two thirds of her bladder volume within a few hours after an outpatient midurethral sling procedure, the first appropriate step is catheterization. This initial treatment relieves the immediate distress of a full bladder and

prevents permanent bladder damage. Continuous transurethral catheterization is less preferable as it is associated with higher rates of UTI, urinary tract irritation, development of bladder calculi and a decrease in bladder capacity over time. Therefore, many institutions adopted teaching patients how to perform self-catheterization either before or after the procedure. If urinary retention with voiding difficulty persists, further treatment will be necessary.

Clean intermittent self-catheterization (CISC) is catheterization performed by the patient or a caregiver on a periodic basis to empty the bladder. It is important to ensure that the bladder never holds more than 500 ml of urine at one time. Bladder distention can result in upper urinary tract reflux, reduced vesical blood flow and UTI. CISC is performed three or four times daily until the residual decreases to less than 100 ml, or at most 50% of the voided volume (37).

Although several reports have shown some benefit with urethral dilatation (17, 38), recent reports have proven urethral dilatation to be ineffective in most patients with urethral obstruction after TVT procedures. Additionally, repeated urethral dilatation may predispose to the development urethral erosion and could induce scarring of the urethra (24, 39, 40). The place of urethral dilatation for urethral obstruction is yet to be studied in a controlled and randomized fashion.

Surgical treatment

When these conservative measures fail, surgical intervention is indicated. Fortunately, persistent postoperative VD is a relatively rare complication after midurethral sling placement. Otherwise, some authors have reported that waiting too long may result in unresolved irritative bladder symptoms such as frequency, urgency and urge incontinence (41-43). In the era of traditional pubovaginal slings, which caused VD more often, most surgeons delayed a release procedure until about 3-6 months after the procedure. This has changed to 2 weeks with midurethral slings. Despite some contradicting reports, most of these release procedures have been effective in correcting VD. The mesh still provides support to the urethra laterally even after the obstruction is released at the midline (43).

After midurethral sling procedures, surgical release for refractory postoperative VD procedures has been indicated for 1-2% of women (8, 44, 45). This is more common after retropubic sling procedures (12, 44, 46). Surgical intervention for VD may consist of mobilization, division of the sling or urethrolysis typically through a vaginal approach. Retropubic or a combined vaginal and retropubic technique are rarely necessary. Successful sling mobilization is possible only in early interventions. If the mobilization attempt fails, the sling is cut at the midline or laterally. Urethrolysis entails more dissection and entry into the retropubic space. It may occasionally require mobilization of the urethra from the pubic bone. Unless the release procedure is delayed too long, urethrolysis is rarely necessary for today's slings. Although there are no well-designed and randomized studies comparing the abdominal and vaginal routes, retrospective data indicate success rates approaching 85%, comparable for retropubic and vaginal routes. Most surgeons prefer transvaginal urethrolysis rather than retropubic or supraperineal approaches (37).

Mobilization or incision of the midurethral sling is highly successful in improving voiding dynamics and should be considered the first line therapy. In a large review by Klutke et al. (24), 17 of 600 patients (2.8%) required reoperation for postoperative VD. Tape release was performed at a mean of 64 days after TVT placement and 16 patients remained continent. Hong et al. reported that 4 of 375 (1%) patients who underwent TVT required tape release or cutting at an average 61 days after the operation and three patients (0.8%) underwent a second TVT procedure for recurrent SUI (17). Sling loosening was reported by Nguyen within approximately 1 week after TVT placement. All patients were continent after mobilization, and quality of life scores of the non-voiders did not differ from those of voiders 1 year after surgery (47). In a retrospective study by Price et al. (48), 33 patients required mobilization of TVT to treat postoperative VD. In each case, the TVT was mobilized and loosened without dividing it within 2 weeks after the original procedure. Voiding function subsequently returned to normal in 29 out of 33 women with no recurrence of original stress incontinence. The four remaining women had the tape divided.

Croak et al. (49) reported that TVT tape dissection using a midline incision for obstructive urinary retention was successful in five (6.4% of 109 TVTs) patients; four of these (80%) remained continent. The incision was performed within 4 weeks of initial placement. A nationwide analysis of obstruction after surgery was performed by Laurikainen and Kilholma. A retrospective review of 9040 patients who underwent a TVT procedure was reviewed. The sling was transected at the midline, uni- or bilaterally, or the sling was resected. Forty-nine percent of the patients were completely cured of their retention and four patients (12%) continued to have retention after lysis. Repeat sling lysis and urethrolisis were options used for refractory retention (50).

A lateral incision technique might be particularly beneficial for avoiding urethral injury in cases whose tape cannot be identified. Long et al. (51) described a technique transecting the tape lateral to the midline on the right side of the periurethral fascia, leaving the tape in the shape of a J underneath the urethra. This procedure had a success rate of 100% with VD in seven women utilizing a lateral incision, but stress incontinence recurred in 28.6% of them. Game et al. (52) presented results from a series of 30 women requiring sling lysis with a single lateral incision over a four-year period. 70% were continent after intervention, and two women developed recurrent SUI. Recently, Kasturi et al. (53) reported 100% success in 15 women undergoing the J cut technique for postoperative VD following midurethral sling. Zubke et al. (54) managed three patients with urethral obstruction after TVT with a novel technique. They cut the tape at the midline with a transvaginal approach and sutured the edges of the tape to a Prolene mesh, thus lengthening the tape. All three patients were continent and resumed normal voiding after intervention.

Conclusion

Surgery for stress incontinence has increasingly shifted towards minimally invasive approaches. Although there are no well-

designed and prospective randomized studies which evaluated VD following midurethral sling procedures as the primary outcome, we have gained significant experience over the last decade. Hypersuspension of urethra by sling can cause symptoms of bladder emptying and low urinary tract. Most cases respond to conservative treatment with temporary indwelling catheter and CISC. If symptoms persist, as occurs in 1-2% of patients, sling mobilization and/or incision almost always resolve the problem. Urethrolisis is rarely necessary for VD after midurethral sling procedures. In a small group of women, another intervention operation may be needed for recurrent stress urinary incontinence.

Conflict of interest

No conflict of interest was declared by the authors.

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